433 In the sphere of industries, the major emphasis has been placed on the expansion of engineering industries. Out of a total investment of Rs. 145 crores in the factory industries, the engineering industries alone will absorb nearly Rs. 63 crores. The majority of light engineering industries to be established or expanded are high value adding industries and would cater to regional demand for implements, tools and other engineering goods. The capital-output ratio for these industries is also comparatively low, viz., 2.1. These are some of the factors on account of which a large scale expansion of engineering industries would be quite feasible in Kerala although the raw materials required by them would have to be imported from other parts of India over long distances. A large scale expansion of engineering industries would help to improve the technological level of other industries and agriculture in Kerala. Apart from being themselves technologically superior, the engineering industries induce technological improvements in other spheres and spread the use of better equipment, tools and machines.

For a steady growth of industries in a State like Kerala where the industrialists have been shy of investing on account of its unstable political climate, it is most essential to take all possible measures to inculcate a sense of confidence among the investor class. The State Government's recent Industrial Policy Declaration expressing their desire to give all possible help to prospective entrepreneurs, marks a step in the right direction. However, the State Government alone may not be able to go far in this matter unless they have the active cooperation of the public and political parties in the execution of their economic policies.

391 One of the chief assets of Kerala from the point of view of its future industrialization programmes is its vast resources of hydro-electric power. During the Second Plan period unfortunately, signs of power shortage were visible and the growth of industries had to suffer as a consequence. For the coming years the State should keep ahead of demand for power and should plan for surplus power generation capacity. Secondly, since the State has plenty of power resources and the costs of generation are very low, it would be in the interest of the economy of the Southern region of India to form a zonal grid. The surplus power generated in Kerala could be sold at a profit to the neighbouring States, especially Madras, which is not so fortunately placed as Kerala in respect of its hydel resources. Kerala would also stand to gain from this transfer of electrical energy since it can generate power at a much lower cost than its neighbouring States, and therefore, earn sizeable revenues from this source.

Total investment effort required for execution of the plans of development suggested in this report would be of the order of Rs. 1,000 crores over the ten-year period. The share of the State Government would be approximately Rs. 500 crores, the balance being left to the initiative of the Private Sector, and the investments through Central Government projects. Total investment would be distributed over the primary, secondary and tertiary sectors in the ratio of 20.8 per cent, 28.8 per cent and 50.4 per cent respectively.

391 464 The impact of the proposed developments on the unemployment situation is not likely to be unimpressive. It is estimated that of the 17.8 lakh jobs envisaged to be created over the decade, 1.8 to 2 lakh jobs would be in the primary sector, 7.8 lakhs in the industrial sector and the balance of 7.7 lakhs in the tertiary sector. It

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would still leave a backlog of about 4.7 lakhs unemployed persons in 1970-71. However, the proportion of unemployed persons to the total population would have been reduced from 4.2 per cent to 2.3 per cent.

It may thus be seen that in spite of certain optimistic assumption regarding creation of employment opportunities and a reduction in the intensity of unemployment, the number of unemployed persons by 1970-71 would be large for a State like Kerala. In the long run an effective solution to the over-population of Kerala can only be provided by a reduction in the rate of population growth through intensification of Family Planning Programmes and migration to other parts of India. The need for widespread use of family planning methods and measures to promote migration, is all the more urgent in a region like Kerala where population density is high, rate of growth of population is rapid, and an acute unemployment problem exists. More reliance on measures to create additional employment opportunities within the State is not enough.

This survey like other similar surveys was undertaken by a team of National Council economists and technicians headed initially by Dr. B. Natarajan and later by myself with the assistance specially of Mr. A.K. Mathur and Mr. S.R. Bose both of whom spent considerable time in the State. At the specific request of the Government of Kerala, the Director-General directed the enquiry in all its stages and visited the State on a number of occasions and guided the team. The names of persons who participated in the survey are listed in appendix 1. To all of them, specially to Mr. Mathur on whom the task of drafting the preliminary report fell, I wish to express my thanks. I would also like to acknowledge the help and cooperation received from the Government and the officers of the Kerala Government, specially the Director of Industries in the various stages of the survey. Finally, to the Minister for Industry, Mr. K.A. Damodara Menon I am specially indebted for his continuous interest in the survey and for the support and encouragement he gave to our staff.

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Chapter 7

Power

KERALA HAS IMMENSE potentiality for the generation of hydro-electric power. The State does not possess any resource of coal or oil (within its own boundary) for generation of power but there are 44 rivers which constitute a storehouse of hydel power. This favourable factor compensates, for the absence of any fossil fuels. Investigations so far have led to an estimate of this potential to be roughly of the order of 1,539 MW.[1]

7.2 One of the basic problems of Kerala's economy is posed by the situation of acute unemployment prevailing in the State. A long run solution to this lies in an intensive programme of industrialization only. An accelerated pace of industrial development, in turn, requires an ensured supply of adequate power. One possible way of looking at power development activities is to consider power as a complementary factor in the programme of industrialization of the State. Targets for power generation capacity in such cases should be fixed slightly higher than what the demand is expected to be.

7.3 The alternative approach, which is the more feasible one for Kerala, is to consider power, generation itself as an industry and to develop the State's abundant hydro-power resources to the maximum extent possible. The surplus of electricity generated over local requirements could be exported to the neighbouring State of Madras, which is not so well placed in respect of its power resources as Kerala. The electricity exported would provide a means of earning revenue, which is turn could be utilized for capital formation within the State. Moreover, a surplus in power generation capacity is desirable in itself since for a State like Kerala, where some factors deterrent to industrialization have been operating in the past, a regular supply of adequate power should be made to act as an incentive for setting up new industries. Planning for a power surplus and export of electrical energy to the neighbouring States should, therefore, form the keynote of the future power development policy in the State.

DEVELOPMENT OF POWER

7.4 The process of power development in the State is already well set. What is now required is to harness the huge energy potential of the State and convert it

[1] By the Central Water and Power Commission.

[text continues on p. 112]

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the cost of generation as estimated at present would rarely exceed 2 nP per unit. As against this, the cost per unit of thermal power is estimated to vary between 6 nP to 10 nP for stations which are far from coal fields, as would be the case if Kerala were to go in for thermal generation. Table 35[2] presents some factual data regarding the cost of hydro-power generation.

7.20 Development of thermal power resources sometimes becomes necessary as a stabilizer for fluctuations in generating capacity of hydro dams caused by variations in the extent of rainfall. This problem does not arise in case of Kerala since a high level of rainfall which, in addition, is fairly well distributed over the year, is practically assured. As pointed out in another chapter, the co-efficient of mean deviation for annual rainfall in the case of Kerala is one of the lowest in the whole of India.

7.21 On account of these factors, electric energy from hydro resources would continue to occupy a predominant place in Kerala. The possibility of generating nuclear power within the foreseeable future can almost be ruled out for Kerala. Investment in nuclear power stations is of the order of Rs. 1,800 to Rs. 2,500 per kW of installed capacity, which is higher than those for thermal and hydro stations. Since Kerala has plenty of untapped hydro-power potential, the question of using nuclear energy does not arise.

DEMAND FOR AND SUPPLY OF POWER

7.22 The simultaneous maximum demand, as recorded on the State electricity system, reached a peak of 94 MW during September, 1960. Over and above this, purchase from Madras State for Kerala system was about 8.6 MW and from Kerala to Madras was about 2.6 MW. So the net draw from the Madras system during September, 1960, was of the order of 6 MW. Hence the latest recorded demand on the State may be taken to be of the order of 100 MW during Sepember, 1960, as against the available firm capacity of 84.5 MW.

7.23 In this context, an independent forecast may be attempted here on the basis of projections for industrial output made in the chapter on Industries. Factory sector is the main industrial consumer of electricity accounting for roughly 65 per cent of energy generated. The net output of factory industry is projected to increase from Rs. 24.4 crores in 1960-61 to Rs. 89.2 crores in 1970-71. In 1955-56, power consumption by industries corresponding to net factory output of Rs. 18.40 crores was 224 million kWh. In other words 1.24 units of electricity were used to produce one rupee worth of net output in industries. The corresponding ratio for the country was 0.8 kWh/Rupee. The relatively higher coefficient in Kerala reflects the more power-intensive industrial structure. This is mainly due to the location of aluminium and other electro-chemical industries in Kerala.

7.24 According to NCAER's projections[1], the power intensity of industries may be expected to increase both as a result of the spread of power-using equipment and

[1] *Demand for Energy in India* (1960—75), NCAER.

[2] [Table 35, appearing on p. 293 of the text, has not been processed. – Analyst]